Software Engineering Methodology

Chapter 8.0
Software Integration and Testing Stage

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Stage: **8.0**
                    Software Integration and Testing Stage

Description: Software integration and testing activities focus on interfaces between and
                    among components of the software product, such as functional correctness,
                    system stability, overall system operability, system security, and system
                    performance requirements (e.g., reliability, maintainability, and availability).
                    Software integration and testing performed incrementally provides feedback on
                    quality, errors, and design weaknesses early in the integration process.

                    In this stage, software components are integrated and tested to determine
                    whether the software product meets predetermined functionality, performance,
                    quality, interface, and security requirements. Once the software product is fully
                    integrated, system testing is conducted to validate that the software product will
                    operate in its intended environment, satisfies all user requirements, and is
                    supported with complete and accurate operating documentation.

Input: The following items provide input to this stage.

                    •   Project File
                    •   Acceptance Test Plan *(draft)*
                    •   Acquisition Plan
                    •   Installation Plan *(draft)*
                    •   Software modules
                    •   Requirements Traceability Matrix *(expanded)*
                    •   Project Test File
                    •   Development baselines
                    •   Transition Plan
                    •   Operating Documentation *(draft)*
                    -           Users Manual
                    -           Programmers Reference Manual
                    •   Training Plan *(draft)*
                    •   Integration Test Plan
                    •   System Test Plan
                    •   Project Plan
                    •   Software Quality Assurance Plan

High-Level
Activities: The remainder of this chapter is divided into sections that describe specific
                    high-level activities performed during this stage. These activities represent the
                    minimum requirements for a large software engineering effort. *Notes* are
                    provided, as applicable, to assist in customizing these lifecycle stage

High-Level

Activities,
continued: requirements to accommodate the different sizes of software engineering
                      efforts. The high-level activities are presented in the sections listed below.

                      8.1   Conduct Integration Testing
                      8.2   Conduct System Testing
                      8.3   Initiate Acceptance Process
                      8.4   Conduct Acceptance Test Team Training
                      8.5   Revise Project Plan
                      8.6   Conduct In-Stage Assessment
                      8.7   Conduct Software Integration and Testing Stage Exit

Output: Several work products are produced during this stage. The work products
                      listed below are the minimum requirements for a large software project.
                      Deviations in the content and delivery of these work products are determined
                      by the size and complexity of the project. Explanations of the work products
                      are provided under the applicable activities described in the remainder of this
                      chapter.

                      •   Integration Test Reports
                      •   System Test Report
                      •   Operating Documents *(final)*
                               -        Users Manual
                               -        Programmers Reference Manual
                      •   Training Plan *(final)*
                      •   Installation Plan *(final)*
                      •   Acceptance Test Plan *(final)*
                      •   Preacceptance Checklist
                      •   Security Checklist
                      •   Error Reporting and Tracking System *(optional)*
                      •   Project Plan *(revised)*

                      A matrix showing the work products associated with each high-level activity is
                      provided in *Exhibit 8.0-1, Software Integration and Testing Stage Activities
                      and Work Products by Project Size.* The matrix also shows which work
                      products are deliverables and whether they are required or optional for small,
                      medium, and large projects.

Review Process: Structured walkthroughs are necessary during this stage to validate work
                      products. The activities that are appropriate for structured walkthroughs are
                      identified throughout the chapter. The time and resources needed to conduct
                      the walkthroughs should be indicated in the project resources, schedule, and
                      work breakdown structure.

Reference: *Appendix C, Conducting Structured Walkthroughs,* provides a procedure and sample forms that can be used for structured walkthroughs.

Bibliography: The following materials were used in the preparation of the Software Integration and Testing Stage chapter.

1.   The Institute of Electrical and Electronics Engineers, Inc., *IEEE Standard for Developing Software Life Cycle Processes,*   IEEE Std 1074-1991, New York, 1992.

2.   U.S. Department of Commerce, National Institute of Standards and Technology, *Guide to Software Acceptance,* 500-180, Washington, D.C., 1990.

3.   U.S. Department of Labor, Directorate of Information Resources Management, *Systems Engineering Concepts and Procedures Manual,*   1988.

4.   U.S. Department of Labor, Directorate of Information Resources Management, *Systems Engineering Standards Manual,* 1988.

Exhibit 8.0-1. Software Integration and Testing Stage Activities and Work Products by Project Size

Work Activity		Project Size			Work Product	Scheduled Deliverables		
		L	M	S		L	M	S
8.1	Conduct Integration Testing	R	R	R	Integration Test Materials Integration Test Report	R R	R R	R R
8.2	Conduct System Testing	R	R	R	System Test Materials System Test Report Operating Documents *(final)* Training Plan *(final)* Installation Plan *(final)*	R R R R R	R R R R R	R R R R A
8.3	Initiate Acceptance Process	R	R	R	Acceptance Test Plan *(final)* Preacceptance Checklist Security Checklist Error Reporting and Tracking System *(optional)*	R R A O	R R A O	R R A O
8.4	Conduct Acceptance Test Team Training	A	A	A				
8.5	Revise Project Plan	R	R	A	Project Plan *(revised)*	R	R	A
8.6	Conduct In-Stage Assessment	R	R	A	ISA Report Form[1]	N	N	N
8.7	Conduct Software Integration and Testing Stage Exit	R	R	A	Stage Exit Meeting Summary	N	N	N

Size:	L = Large	Minimum Requirements:	R	= Required	O	= Optional work product	
	M = Medium		A	= As Appropriate	[1]	= Completed by reviewer	
	S = Small		N	= Not Applicable			